

CLAIMS

What is claimed is:

1. A revolution type actuator having a movable member performing a revolution motion, comprising:

a movable member that can revolve with respect to a fixed member;

a plurality of conducting paths which are on a face parallel to a trajectory face of said revolution motion and by which currents flow in intersecting directions mutually;

a power supply which flows currents with a phase difference in said plurality of conducting paths; and

a magnetic field generator which forms a magnetic field perpendicular to said conducting path;

wherein said movable member revolves due to an electromagnetic force generated by an interaction between a current flowing in said conducting path and a magnetic field generated by said magnetic field generator.

2. The revolution type actuator according to claim 1,

wherein the conducting path is provided two, which intersect with each other at an angle of about 90°; and

currents flowing through said two conducting paths have a phase difference of about 90° therebetween.

3. The revolution type actuator according to claim 1, wherein the conducting path is formed on a printed circuit board.

4. The revolution type actuator according to claim 1, wherein the magnetic field generator includes a magnet, and an outer case made of a magnetic substance for forming an enclosed magnetic path in which magnetic flux occurring from said magnet passes.

5. The revolution type actuator according to claim 1, further comprising a rotation constraining mechanism for holding the movable member on the fixed member in a rotary manner via an eccentric shaft to thereby constrain said movable member from rotating.

6. The revolution type actuator according to claim 1,
wherein the magnetic field generator includes a magnet and a stator which is magnetized by magnetic flux generated by said magnet; and

the movable member is provided with a conductor which is arranged opposite to a magnetic pole of said magnet in a plane perpendicular to magnetic flux interposed between said magnet, and said stator to thereby form the conducting path, thus revolving due to an electromagnetic force generated by an interaction between a current flowing through said conducting path and a magnetic field formed by said magnetic flux.

7. The revolution type actuator according to claim 6, wherein the movable member is entirely or partially made of a magnetic substance.

8. The revolution type actuator according to claim 7, wherein the stator approaches steadily facing to a magnetic substance of the movable member, and has a magnetized face which is perpendicular to said revolving trajectory face.

9. The revolution type actuator according to claim 6, wherein the magnet has N- and S-poles on inner and outer peripheries respectively which are on one face opposite the movable member, to thereby form a magnetic circuit in which magnetic flux starting from one of said poles enters the stator, thus preventing magnetic flux from leaking to an external space from a face opposite to a face having both of said poles of said magnet.

10. The revolution type actuator according to claim 6,
wherein a magnetic substance is arranged on a pole face of the magnet opposite the movable member and the conducting path; and

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said magnetic substance has a face thereof opposite said conducting path formed larger in area than a largest revolving region of said conducting path and smaller than the pole face, and a face thereof opposite the magnet formed almost as large as said pole face.

11. The revolution type actuator according to claim 1,
wherein the movable member is entirely or partially made of a magnet;
the magnetic field generator includes said magnet and a stator which is magnetized by magnetic flux generated by said magnet;
the conducting path is arranged on the side of the stator opposite to a pole of said magnet of said movable member; and
said movable member is arranged in a plane perpendicular to magnetic flux running between said magnet and said stator, thus revolving due to an electromagnetic force generated by an interaction between a current flowing in said conducting path and a magnetic field generated by said magnetic flux.

12. The revolution type actuator according to claim 6, wherein a spring is interposed between the movable member and the stator.

13. The revolution type actuator according to claim 12, wherein the spring is provided with a bearing at a tip thereof on the side of the movable member.

14. The revolution type actuator according to claim 1, wherein the conducting path is made of a face-shaped conductor.

15. The revolution type actuator according to claim 14,
wherein the face-shaped conductor is provided with a plurality of electrodes; and
the direction of a current flowing through said face-shaped conductor is controlled by sequentially changing said current flowing electrodes.

16. The revolution type actuator according to claim 1,

wherein the conducting paths are comprised of a plurality sheets of face-shaped conductors which are stacked one on another with insulation maintained therebetween and which are provided with electrodes so as to flow current in different directions; and

said current flowing electrodes can be sequentially changed to thereby control a current flowing through each of said conducting paths, so that the directional electromagnetic force generated by an interaction between said current and said magnetic field may provide a circular motion time-wise.

17. The revolution type actuator according to claim 1 having a configuration

of a scroll pump,

wherein the movable member is held on said fixed member in a revolutionary manner via an eccentric shaft;

said actuator further comprises:

a movable scroll having spiral blades provided to said movable member; and

a fixed scroll having spiral blades provided to said fixed member;

said spiral blades of said movable and fixed scrolls are combined with each other;

and

wherein said movable scroll is revolved around said eccentric shaft with a predetermined radius to thereby shift an enclosed space formed by said spiral blades of both of said scrolls from the outside toward the center, thus consecutively reducing the volume of said enclosed space.

18. The revolution type actuator according to claim 1 having a configuration of a scroll pump,

wherein the movable member is provided two, which are each held to said fixed member in a revolutionary manner via an eccentric shaft;

said movable members are each provided with a movable scroll having spiral blades;

said spiral blades of said movable scrolls are combined with each other; and said movable scrolls are revolved mutually oppositely with a predetermined radius around said eccentric shaft to thereby shift enclosed space formed by said spiral blades of said scrolls from the outside toward the center, thus consecutively reducing the volume of said enclosed space.

19. A revolution type actuator, comprising:

a conducting member having a plurality of conducting paths by which currents flow in intersecting directions mutually;

a power supply which flows currents with a phase difference in the plurality of conducting paths; and

a magnetic field generator which forms a magnetic field perpendicular to a conducting face formed by said conducting paths,

wherein either one of the conducting member and the magnetic field generator revolves due to an electromagnetic force generated by an interaction between a current flowing in the conducting path and a magnetic field generated by the magnetic field generator.